

$$E8 = \frac{25.98 + 11.26DPR_1 + 0.02201DPR_1^2 + 0.5231DPR_1^3}{1 - 0.8557DPR_1 + 0.00887DPR_1^2 + 0.02049DPR_1^3 - 0.000002866DPR_1^4} \times \left[\frac{(Ra-1)(Ra-2)(Ra-4)(Ra-6)(Ra-10)(Ra-12)}{(8-1)(8-2)(8-4)(8-6)(8-10)(8-12)} \right]$$

$$E10 = \frac{20.75 - 3.371DPR_1 + 0.9026DPR_1^2 + 0.01277DPR_1^3}{1 - 0.1514DPR_1 + 0.03173DPR_1^2 + 0.0003673DPR_1^3} \left[\frac{(Ra-1)(Ra-2)(Ra-4)(Ra-6)(Ra-8)(Ra-12)}{(10-1)(10-2)(10-4)(10-6)(10-8)(10-12)} \right]$$

$$E12 = \frac{51.67 + 18.94DPR_1 + 21.57DPR_1^2 + 21.57DPR_1^3}{1 + 1.183DPR_1 + 0.5513DPR_1^2 - 0.00004359DPR_1^3} \left[\frac{(Ra-1)(Ra-2)(Ra-4)(Ra-6)(Ra-8)(Ra-10)}{(12-1)(12-2)(12-4)(12-6)(12-8)(12-10)} \right]$$

- 5 and where Ra ranges from 1 to 12, and DPR_1 is greater than 0 and less than 300. Preferably, $Q_2 \leq 18\%$ if $DPR_1 < 1$; $Q_2 \leq 16.5\%$ if $1 \leq DPR_1 < 3$; $Q_2 \leq 15\%$ if $3 \leq DPR_1 < 5$; $Q_2 \leq 10\%$ if $5 \leq DPR_1 < 10$; $Q_2 \leq 7\%$ if $10 \leq DPR_1 < 15$; $Q_2 \leq 6\%$ if $15 \leq DPR_1 < 20$; $Q_2 \leq 4\%$ if $20 \leq DPR_1 < 30$; $Q_2 \leq 3\%$ if $30 \leq DPR_1 < 50$; $Q_2 \leq 2\%$ if $50 \leq DPR_1 < 100$; and $Q_2 \leq 1\%$ if $100 \leq DPR_1 < 200$. In preferred embodiments the fluid is
- 10 passed into the manifold with a momentum (Mo) of at least 0.05.

In another aspect, the invention provides a louvered fluid processing device, comprising: an inlet to a chamber; a louver disposed within a chamber; and an outlet from the chamber. A louver is a movable flow director. An example is illustrated in Fig. 34B. Preferably, there are at least two louvers in the chamber that are connected

15 to rotate simultaneously. Other options include: at least 3 coplanar inlets; further comprising a second chamber that is stacked adjacent to the chamber, wherein the first chamber comprises a heat exchanger. In one preferred method involving the two chamber process, flows are substantially perpendicular to flow through the heat exchanger biased to front of second (reaction) chamber. In some embodiments, the

20 chamber has height of 5 micrometers or less.

In another aspect, the invention provides fluid processing apparatus comprising: a manifold; a connecting channel matrix; and a movable orifice plate disposed between the manifold and the matrix, wherein the movable orifice plate has orifices of varying sizes that are aligned with channels in the connecting channel

25 matrix. An example is illustrated in Fig. 39. In a preferred embodiment, the movable orifice plate is held in place by screws. In some embodiments the movable plate has orifices that increase monotonically in size along the length of the plate. As in many of the other aspects, in some preferred embodiments, channels in the connecting channel matrix have the same cross-sectional area. The invention also provides a